

THE BUTTERFLIES (INSECTA: LEPIDOPTERA) OF CROOKED,  
ACKLINS AND MAYAGUANA ISLANDS, BAHAMAS, WITH A  
DISCUSSION OF THE BIOGEOGRAPHICAL AFFINITIES OF  
THE SOUTHERN BAHAMAS AND DESCRIPTION OF A  
NEW SUBSPECIES BY H. K. CLENCH

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ABSTRACT

Records of butterflies from Crooked, Acklins and Mayaguana islands, Bahamas, are enumerated, and an appendix by the late Harry K. Clench is presented. Several new taxa are described: *Memphis intermedia venus*, *Memphis intermedia mayaguanae*, *Hemiargus thomasi clenchi*, *Eurema chamberlaini clenchi*, all Miller, Simon and Harvey; and *Strymon acis leucosticha* H. K. Clench. Biogeographical affinities of the butterflies of the isolated southern Bahamas are analyzed in light of Tertiary tectonic and Pleistocene climatic events.

INTRODUCTION

Crooked and Acklins are the dominant islands on their small shared bank. This bank lies some 30 mi (48 km) southeast of the Great Bahama Bank and is separated from it by the Crooked Island Passage, a deep channel that was not emergent at any time during the Pleistocene. To the south lies Great Inagua (see Simon and Miller, 1986) also on its own bank about 50 mi (80 km) from Acklins and also separated by deep water except for the now submerged Hogsty Reef. To the east of Acklins lies Mayaguana, a small island on a very small bank, separated from Crooked and Acklins by the deep Mayaguana Passage. Mayaguana is in turn separated from the Inaguas, which lie to the southwest, and from the islands of the Caicos Bank to the southeast by the Caicos Passage. These islands of the southern Bahamas are considerably farther from one another than are the northern ones, and apparently always have been separate, even during lowered sea levels of the Pleistocene.

The three islands are relatively low (but not for the Bahamas) and almost entirely formed of coral rock. Each has a low "spine" through the center that is less than 100 m (330 ft) in elevation. Crooked has an area of 181 km<sup>2</sup>, Acklins 497 km<sup>2</sup> and Mayaguana 285 km<sup>2</sup>, compared to an adjusted (for the presence of Lake Rosa) area of 1269 km<sup>2</sup> for Great Inagua (Anonymous, 1976, modified by Clench, MS). All three islands are slightly to considerably wetter than Great Inagua, which

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receives 28 in (71 cm) of rain annually. Mayaguana receives 32 in (81 cm), Acklins 36 in (91 cm) and Crooked 38 in (97 cm) of yearly rainfall (Anonymous, 1976), but they are much drier than islands to the north, which may receive as much as 65 in (165 cm) of rainfall each year.

Crooked is about 20 km long along a southeast to northwest axis, and 10 km at its greatest width northeast to southwest. It is a hilly island for the Bahamas, elevations reaching 155 ft (47 m). The human population of the island is about 350, most of whom live in either Colonel Hill near the center of the island or at Landrail Point (=Pitts Town) at the northwest corner. Other, smaller settlements include Church Grove, Majors Cay, Browns and Cabbage Hill. A small, saline lake near the northwestern end of the island, near Landrail Point, has some mangroves around its margins; another mangrove swamp occurs in the area south of Colonel Hill, and scattered stands of mangroves occur elsewhere along the coastline. Usually, the narrow coastal strand has such typical plants as Bay Cedar (*Suriana maritima* L.) and planted Australian Pines (*Casuarina*). Inland, the forest changes abruptly to dry-to-mesic hammocks with vegetation similar to but lush than that on Great Inagua (Clench and Bjorndal, 1980). Scattered hypersaline areas and disturbed areas (particularly around towns) each bear characteristic plants and support different butterflies.

Acklins is an irregular, L-shaped island that is widest (12 km [7.5 mi]) at the northern segment near Northeast Point. It is about 48 km (29 mi) from Northeast Point to Salina Point. The maximum elevation is 142 ft (43 m) (Anonymous, 1976), but Clench (MS) claimed that one hill near Jim Point exceeds 61 m (200 ft) in elevation. The population was 936 people in 1975, most centered in Spring Point, with other people living in outlying villages such as Snug Harbor, Pinefield, Lovely Bay and Delectable Bay. Habitats are substantially the same as on Crooked, but Clench (MS) stated that there is none of the high, dense, hammock-like forest characteristic of Crooked's interior. Miller's (1987) assertion to the contrary may be in error.

Mayaguana, oriented west-northwest to east-southeast, is about 25 km (15.5 mi) long and perhaps 6 km (nearly 4 mi) wide at its widest point. The approximately 850 residents (581 in the 1975 census [Anonymous, 1976]) live in the towns of Abrahams Bay on the south-central coast and Pirates Well and Bessy Bay on the northern coast. Highest elevations are a 131 ft (40 m) point just northwest of Abrahams Bay and a 105 ft (32 m) hill just west of the airport. The vegetation types are similar to those on Crooked and Acklins, but the island's relative aridity approaches that of Great Inagua.

Until 1979, the butterflies of Crooked, Acklins and Mayaguana islands were not well studied, with field work totalling 11 man-hours of butterfly collecting on Acklins, 15 on Crooked and four on Mayaguana (Clench, MS). Before his death, Harry Clench, a curator at the Carnegie Museum of Natural History, had planned a trip to these islands to complete his study of Bahamian butterflies. Instead, in 1979 and from 1986–89, the authors spent 42 man-hours collecting butterflies on Acklins, 200 on Crooked and 102 on Mayaguana.

This collecting activity increased the number of species recorded prior to 1979 from 18 to 27 on Crooked, 14 to 25 on Acklins and five to 22 on Mayaguana (plus a sight record that is not confirmed by a specimen). These figures are consistent with species/area projections, with the exception of Acklins.

Crooked and Acklins are very similar faunistically, as expected, because they share the same bank, whereas the picture is more complex elsewhere. Great (and

Little) Inagua usually share faunal elements with islands of the Caicos and Turks Banks, and all of these islands share several subspecies with Mayaguana, whose fauna, in turn, more closely resembles that of Turks and Caicos than the Inaguas. Few butterflies on these islands occur in the Crooked-Acklins fauna. The butterfly faunas of the Inaguas, Turks and Caicos and Mayaguana are not identical, however, differing especially in the local subspecies of *Eurema chamberlaini* (Butler) and *Memphis intermedia* (Witt). These differences and similarities allow analysis of the southern Bahamian fauna and its differentiation from that of the northern Bahamas.

Most of the specimens collected by Harvey are in the Carnegie Museum of Natural History, Pittsburgh (CMNH), and the majority of the butterflies and moths collected by Miller and Simon are in the Allyn Museum of Entomology of the Florida Museum of Natural History, Sarasota (AME).

### COLLECTING LOCALITIES

#### *Crooked Island*

1. Vicinity of Colonel Hill. This locality is more than 1 km inland from the coast and is either in the disturbed habitats around town or in tall forest, so that several habitats are involved. The disturbed country habitat had plants such as *Bidens* and *Bourreria*, and attracted mostly “weedy” species of butterflies. The forest margin habitats were in hilly country, had fewer flowers and more indigenous butterflies. The forest had some trees higher than 10 m (33 ft), which is greater than tree-height on Great Inagua (Simon and Miller, 1986) [Harvey in 1979].

2. Airport, ca. 1.5 mi W of Church Grove and 2 mi SE of Colonel Hill. This area was disturbed country near the coast, bordering on a mangrove swamp, with flowers such as *Bourreria* in the disturbed area and *Avicennia* in the mangrove swamp [Harvey in 1979].

3. Church Grove, a small inland settlement on a high hill midway between the airport and Landrail Point. The area is drier than around Colonel Hill, but there are many cultivated flowers in the town. Little collecting was done here [Harvey in 1979].

4. 1.5 mi W of Church Grove. This area was a mangrove swamp just below the hill on which Church Grove is situated. The predominant flowers were those of black mangrove (*Avicennia germinans* Jacq.), and these attracted many butterflies. The area was dry with no flowers and very few butterflies when visited by Miller and M. J. Simon in 1986 [Harvey in 1979].

5. Fairfield. This locality on the east-central part of the island is in typical low scrub, practically indistinguishable from other nonhammock localities on the island [Harvey in 1979].

6. Ferry crossing about 2 mi E of Browns. This area is predominantly coastal scrub, but there are salt flats nearby with *Salicornia* and associated halophytic vegetation [Harvey in 1979].

7. Cabbage Hill. This town is located in the middle of the island at an elevation of ca. 20 m. The vegetation is highly disturbed in town, but is more typical scrub farther from habitation [Harvey in 1979].

8. Pitts Town (=Landrail Point) and environs. The town lies on the northwest coast of the island. Collecting was done in town or along the road within a half mile of the town. The habitats were largely disturbed and flowers of *Bidens pilosa* L.



and *Stachytarpheta jamaicensis* (L.) Vahl predominated, along with those of cultivated *Bougainvillea*. The soils are sandy, rather than rocky [Simon and Miller in 1986].

9. 2–4 mi E of Pitts Town. This locality is in the tall, inland hammock-like forest. Flowers were scarce and found only along the forest margins. Most collecting was done either along the road or on short trails into the woodland [Simon and Miller in 1986].

10. 6 mi E of Pitts Town. This was a small mangrove swamp and its margins. The margin of the swamp was arid, but there were a few flowers, especially *Passiflora* and *Stachytarpheta*. Butterflies were fairly common here [Simon and Miller in 1986].

11. 1.5–2 mi W of Church Grove (same as locality 4). This area was excessively dry during 1986 [Simon and Miller in 1986].

12. 0–1 mi NW of Landrail Point (same as locality 8). This area was quite dry, and the *Stachytarpheta* that bloomed so profusely in 1986 was absent in 1988 [Miller and Simon in 1988].

13. Vic. Landrail Point. Specimens from this locality were collected in several disturbed sites near the edge of town. At two of the sites, *Stachytarpheta* was blooming in profusion, and at another there were large and impressive stands of blooming *Lantana* and *Bourreria* [Miller and Simon in 1988].

14. 6 mi E of Landrail Point (same as locality 10). Vegetation was unchanged from 1986 [Miller and Simon in 1988].

15. Crooked Island airport. This locality, about 2 mi east of Colonel Hill, was very much disturbed. The only time we collected there, it was very dry and disappointing, despite recent rains [Miller and Simon in 1988].

16. Salina west of True Blue. This locality was extremely dry and had few plants other than *Batis* [Miller and Simon in 1988].

17. True Blue. This locality was a disturbed area in a churchyard in town. There were some blooming *Lantana* plants that attracted a few butterflies [Miller and Simon in 1988].

18. 2 mi E of True Blue. This locality is very close to the now abandoned settlement of Browns. The area was one of low scrub, but along the roadway was a profusion of blooming *Stachytarpheta* that attracted many hesperiids [Miller and Simon in 1988].

19. Ferry crossing at east end (same as locality 6). There is a mangrove swamp along the coast and a wide expanse of salt flats just inland from it. This is abruptly replaced by typical low scrub farther west. Many examples of flowering bushes (*Lantana* and others) were present at this locality, and a few *Avicennia* trees were also in bloom [Miller and Simon in 1988].

20. 0–2 mi E of Landrail Point. This locality was collected over four days, 9–12 May 1989. It harbors perhaps the lushest hammock growth on the island with large numbers of Torchwood (*Amyris elemifera* L.) trees [M. J. and R. A. Simon in 1989].

#### *Acklins Island*

1. Pinefield.
2. 1.5 mi S of Pinefield.
3. Anderson.
4. Snug Corner.
5. 2 mi S of Hard Hill.



6. Harry Point.
7. Delectable Bay.
8. Vicinity of Spring Point.
9. Lovely Bay.

These localities [all Harvey in 1979] were surprisingly alike with lowland scrub vegetation. None had hammock-like vegetation, and, with the exception of *Casuarina*, there were no tall trees. Hypersaline environments were encountered near Pinefield, Harry Point and Delectable Bay. This lack of conspicuous hammock vegetation on Acklins seems to contradict Miller's (1987) assertion that *Heracles aristodemus majasi* should occur on the island; perhaps it does not.

### *Mayaguana Island*

1. Abrahams Bay, formerly Charlton Settlement. This community lies on the south-central coast of the island. It had some relict forest patches nearby that are completely surrounded by disturbed country, usually with an abundance of flowers. There were some small, isolated salt flats overgrown with halophilous plants such as *Batis maritima* L. [Harvey in 1979].

2. 1 mi NE of Abrahams Bay. This area is in the coastal thorn scrub with relatively few plants over 5 m (8 ft) tall [Harvey in 1979].

3. 1 mi N of Abrahams Bay. This area is in the transition from thorn scrub to taller hammock-like forest. Most collecting was done along the trail from Abrahams Bay to Pirates Well. There was a profusion of *Amyris elemifera* L. here in dense scrub. Most of the swallowtails were encountered from here to locality 4 [Harvey in 1979].

4. 2 mi N of Abrahams Bay. This area is in the taller hammock-like forest, which is almost impenetrable, and most collecting was done on the trail mentioned above. There are usually flowers when rain has fallen, and it evidently gets more rain than does any other area [Harvey in 1979].

5. Pirates Well. This area has disturbed habitats within and close to the settlement [Harvey in 1979].

6. 4 mi W of Abrahams Bay. This area is near the airport and marks the end of the humid woodlands and the beginning of the arid western end of the island. Plants include *Bidens* and other Compositae [Harvey in 1979].

7. Mayaguana airport. This is about four road miles west of Abrahams Bay and is disturbed country bordering on dry short forest. Most collecting was done in the disturbed country [Harvey in 1979].

8. Vicinity of Abrahams Bay (same as locality 1). Due to recent rains, it was relatively lush and yielded many butterflies. The only halophilic butterflies seen were taken at a small salt pan. Flowers were plentiful, especially those of *Bidens* and *Lantana* [Simon and Miller in 1987].

9. 0–3 mi N of Abrahams Bay (includes localities 3, 4). Here coastal scrub blends into dry forest, with occasional small hammocks, which continues northward almost to the north coast. The soil is rocky, and the trees are predominantly *Acacia* and *Amyris*; flowers are mostly *Lantana*, *Bidens* and those of various undetermined legumes. Most of the collecting was done in this area [Simon and Miller in 1987].

10. 3 mi S of Mayaguana airport. This area was selected because it had the largest *Amyris* stand on the island. It is a rocky area about 30 m (100 ft) in elevation and faces the southwest coast. Besides the numerous Torchwood, the

dominant vegetation is *Acacia*. Very few butterflies were encountered because it was so dry [Simon and Miller in 1987].

#### SYSTEMATIC ACCOUNTS

Data are given only for material collected by the authors, although earlier records of taxa that we did not capture are mentioned. Most of these earlier records are included in Clench (MS).

##### Family Danaidae

##### *Danaus plexippus* (Linnaeus, 1758)

This insect was encountered only on Crooked, specimens of which seemed referable to both nominotypical *plexippus* and to the southern West Indian subspecies *D. p. megalippe* (Hübner). This raises the question of correct subspecific definition or whether there was an admixture of North American migratory with Antillean sedentary populations in the southern Bahamas. Inaguan specimens are definitely *megalippe* (Simon and Miller, 1986:3).

Eggs and larvae were found on *Asclepias curassivica* L. at Colonel Hill. Adults visited flowers of the Milkweed and *Eugenia* sp. there, and specimens were taken at *Stachytarpheta* flowers at Pitts Town.

*Localities*.—**Crooked**: Colonel Hill, 17 and 19.vii.1979, Cabbage Hill, 20.vii.1979; Pitts Town, 23, 24 and 27.ix.1986.

##### Family Nymphalidae

##### *Agraulis vanillae insularis* Maynard, 1889

This species is abundant on all three islands. It was seen visiting many diverse flowers such as *Cynanachum* sp., *Bourreria ovata* Miers, *Borrchia* sp., *Cordia bahamensis* Urb., *Lantana involucrata* L., *Suriana maritima* L. and *Stachytarpheta jamaicensis* (L.) Vahl. A female was noticed ovipositing on an unidentified *Passiflora* about 6 mi east of Landrail Point.

No differences can be detected among populations throughout the Bahamas and, along with *Kricogonia lyside* (Godart), this species is a candidate for the most ubiquitous butterfly in the islands.

*Localities*.—**Crooked**: vic. Colonel Hill, 17, 20, 28 and 29.vii.1979; airport, ca. 2 mi SE of Colonel Hill, 19.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979, 26.ix.1986; Fairfield, 20.vii.1979; ferry crossing, ca. 2 mi W of Browns, 21.vii.1979; vic. Pitts Town, 22 and 27.ix.1986; vic. Landrail Point, 21, 22.ix.1988; 0–1 mi NW Landrail Point, 19.ix.1988; 6 mi E of Pitts Town, 24.ix.1986; True Blue, 20.ix.1988; ferry crossing at E end of island, 20.ix.1988. **Acklins**: Pinefield, 22 and 23.vii.1979; ca. 1.5 mi S of Pinefield, 24.vii.1979; Anderson, 25.vii.1979; Delectable Bay, 26.vii.1979; Snug Corner, 26.vii.1979; vic. Spring Point, 27.vii.1979. **Mayaguana**: Abrahams Bay, 7.viii.1979, 27.ix.1987; ca. 1 mi N of Abrahams Bay, 4.viii.1979; ca. 2 mi N of Abrahams Bay, 3.viii.1979; 0–3 mi N of Abrahams Bay, 28 and 29.ix.1987.

##### *Dryas iulia carteri* (Riley, 1926)

We observed this butterfly only on Crooked, apparently at the southern end of its distribution. It was common in the central part of the island and abundant on the western part. It was observed nectaring at *Cynanchum* and *Bourreria ovata*, whereas most of the specimens collected were on the flowers of a cultivated *Bougainvillea*. There is no difference between the Crooked Island material and specimens from farther north in the Bahamas.

*Localities.*—**Crooked:** Colonel Hill, 29.vii.1979; vic. Colonel Hill, 17, 19, 20 and 28.vii.1979; Church Grove, 18.vii.1979; *ca.* 1.5 mi W of Church Grove, 18.vii.1979; Fairfield, 20.vii.1979; vic. Pitts Town, 22, 23 and 24.ix.1986; vic. Landrail Point, 21, 22.ix.1988; 2–4 mi E of Pitts Town, 23 and 24.ix.1986; 6 mi E Landrail Point, 21.ix.1988; ferry crossing at E end of island, 20.ix.1988; 0–2 mi E of Landrail Point, 9–12.v.1989.

*Euptoieta hegesia hegesia* (Cramer, 1779)

These insects were abundant on Crooked in 1979, 1986 and 1988, on Acklins in 1979 and on Mayaguana in 1987. The specimens from Mayaguana were not seen outside the immediate confines of Abrahams Bay. Still, the insects are less common on any of these islands than they are on Great Inagua (Simon and Miller, 1986:4). They nectar frequently on *Bourreria ovata* and *Cordia bahamensis* on Acklins, whereas they were found on *Bidens* on Crooked and on an unidentified composite on Mayaguana.

*Localities.*—**Crooked:** vic. Colonel Hill, 17.vii.1979, first record for island; vic. Pitts Town, 23.ix.1986; vic. Landrail Point, 21, 22.ix.1988; ferry crossing at E end of island, 19.ix.1988; 0–2 mi E Landrail Point, 9–12.v.1989. **Acklins:** Pinefield, 22 and 23.vii.1979; *ca.* 1.5 mi S of Pinefield, 24 and 25.vii.1979; Harry Point, 26.vii.1979; Delectable Bay, 26.vii.1979; vic. Spring Hill, 27.vii.1979; Lovely Bay, 28.vii.1979. **Mayaguana:** vic. Abrahams Bay, 27.ix.1987; first records from island.

*Eresia frisia frisia* (Poey, 1832)

This species was recorded on Crooked Island by the Armour Expedition (Clench, MS), and by the authors near Landrail Point, 9–12 May 1989.

*Junonia genoveva* (Cramer, 1780)

This species was recorded from Crooked and Acklins in 1979 and from Mayaguana in 1987. Individuals were found nectaring at *Stachytarpheta* on Crooked and were taken at mud on Mayaguana. They are always found close to the putative foodplant, *Avicennia*.

*Localities.*—**Crooked:** ferry crossing *ca.* 2 mi W of Browns, 21.vii.1979, first record for island; ferry crossing at east end of island, 24.ix.1988; vic. Pitts Town, 25 and 27.ix.1986; 2–4 mi E of Pitts Town, 24.ix.1986. **Acklins:** Delectable Bay, 27.vii.1979, first records from island. **Mayaguana:** vic. Abrahams Bay, 27.ix.1987, first records from island.

*Marpesia eleuchea bahamensis* Munroe, 1971

Specimens were taken in low coastal scrub. The species, recorded nectaring on *Cordia bahamensis* on Crooked and Acklins, was not common, and it was not found on Mayaguana.

*Localities.*—**Crooked:** vic. Colonel Hill, 17 and 28.vii.1979, first records for island; vic. Pitts Town, 27.ix.1986. **Acklins:** Spring Point, 27.vii.1979; first records for island.

[*Hamadryas amphichloe diasia* (Fruhstorfer, 1916)]

A single individual of this unmistakable Antillean endemic was seen, but not captured, on 30 September 1987 about 2 mi N of Abrahams Bay, Mayaguana. The insect has never been recorded from the Bahamas, but a hurricane had crossed Hispaniola (where *diasia* is abundant) and brushed Mayaguana three days prior to the sighting. We postulate that this insect was blown to Mayaguana (it is a strong flyer) from its native habitat by winds peripheral to the storm.



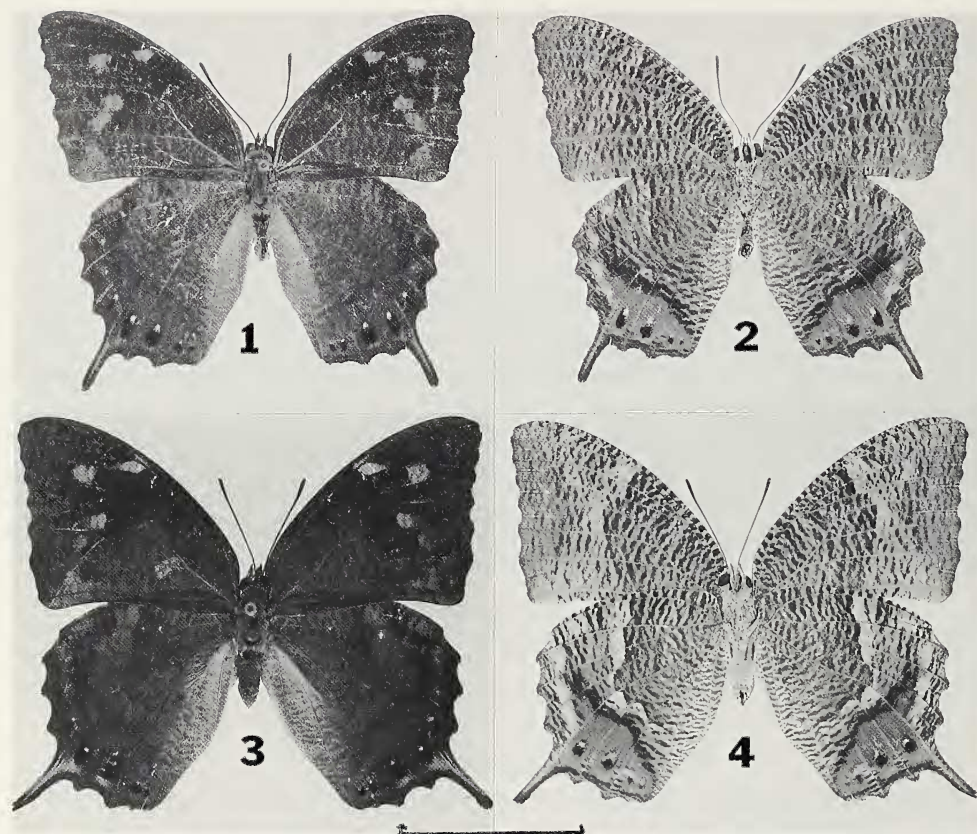


Fig. 1-4.—*Memphitis intermedia venus*, n. subsp. 1-2. Holotype ♂, upper (1) and under (2) surfaces; BAHAMAS: Acklins I.: Pinefield, 22.vii.1979, D. J. Harvey Sta. 14 (CMNH). 3-4. Paratype ♀, upper (3) and under (4) surfaces; BAHAMAS: Crooked I.: vic. Pitts Town [=Landrail Point], 24.ix.1986, M. Simon and L. Miller, sta. 1986-5 (AME). Scale line = 20 mm.

*Memphitis intermedia venus*, new subspecies  
(Fig. 1-4)

**Description.**—**Male:** Upper surface ground color more orange than that of *M. i. intermedia* (Witt); forewing postmedian spots average larger than in nominate subspecies (but in some individuals these may be almost absent, especially those posteriad of  $Cu_2$ ); hindwing anterior pale shade very weak (often absent; always prominent in other *intermedia* subspecies); hindwing submarginal ocelli only in spaces  $M_3$ – $Cu_1$  to tornus (an ocellus also present in  $M_2$ – $M_3$  in nominotypical subspecies and the following one described from Mayaguana); white submarginal hindwing spots characteristic of *intermedia* and *mayaguanae* absent or very weakly indicated.

Undersurface similar to that of nominotypical subspecies, but with more extensive pale markings on hindwing, a broader chestnut inner border to the olive-green hindwing patch and weaker hindwing ocelli posteriad of  $M_3$  than in nominotypical *intermedia*.

Male genitalia as in *M. i. intermedia*.

Length of forewing of holotype male 28.6 mm, those of male paratypes range from 25.8 to 30.8 mm, averaging 28.2 mm.

**Female:** Differs from nominotypical *intermedia* in the same respects as does the male, with the exception that the white submarginal spots on the upper hindwing are more prominent, as are the postmedian spots on the upper forewing, these being more tawny than in male.

Lengths of forewings of female paratypes range from 27.1 to 36.9 mm, averaging 33.2 mm.

Described from 181 specimens, 123 males and 58 females, from Acklins and Crooked islands, Bahamas.

*Type material.*—Holotype male: BAHAMAS: Acklins I.: Pinefield, 22.vii.1979 (D. J. Harvey). Paratypes: all BAHAMAS: Acklins: 19 males and 7 females, same data as holotype; same locality as holotype, 23.vii.1979 (13 males and 8 females), 24.vii.1979 (3 males and 1 female); ca. 1.5 mi S Pinefield, 25.vii.1979 (1 male); Anderson, 25.vii.1979 (1 male); Snug Corner, 25.vii.1979 (1 male), 26.vii.1979 (1 male); Delectable Bay, 26.vii.1979 (3 males and 2 females), 27.vii.1979 (4 males and 2 females); Gold Rock, March 6, 1909 (1 male and 1 female); "Pinefields" (Pinefield), 7.vi.1976, on *Solanum* (3 males and 2 females); Spring Point, 5.vi.1976 (1 female). **Crooked:** 3 mi E Majors Cay, 20.iii.1976 (1 male and 1 female); ferry crossing, ca. 2 mi W Browns, 21.vii.1979 (24 males and 3 females); vic. Colonel Hill, 28.vii.1979 (3 males); Colonel Hill, 29.vii.1979 (1 male); vic. Pitts Town, 23.ix.1986 (6 males and 3 females), 24.ix.1986 (4 males and 6 females), 25.ix.1986 (8 males and 5 females), 26.ix.1986 (2 males and 1 female); vic. Landrail Point, 21.ix.1988 (1 male), 22.ix.1988 (1 male); 2–4 mi E Pitts Town, 27.ix.1986 (1 female); 6 mi E Pitts Town, 24.ix.1986 (7 males and 7 females), 25.ix.1986 (6 males and 2 females), 26.ix.1986 (2 males and 3 females); 1 mi NW Landrail Point, 19.ix.1988 (1 female); 0–2 mi E Landrail Point, 9–12.v.1989 (3 males and 1 female).

*Disposition of type series.*—Holotype male, 78 male and 29 female paratypes, CMNH; 35 male and 21 female paratypes, AME; and 8 male and 9 female paratypes in collection of M. J. Simon.

*Etymology.*—The name is a classical reference to the goddess of love.

*Discussion.*—Harry Clench (MS) suggested that *M. verticordia* (and its recognized subspecies), *echemus* (Doubleday) and its subspecies, *intermedia* (Witt) and *bahamae* (Witt) were conspecific and should all be considered subspecies of *verticordia*. Perhaps he was right, given that all of the taxa are allopatric. All, however, show genitalic differences usually sufficient to separate species in the *Memphis* complex. Pending further study, it seems most prudent to consider the species as distinct, with the further proviso that *verticordia* and *intermedia* are closely related, perhaps sister taxa, as are *echemus* and *bahamae*.

Clench recognized the status of the Crooked-Acklins butterflies and proposed the name "*venus*" in notes accompanying his series, but he never published a description of it, nor could we find any notes for such a description. We are, however, limiting the type series more than Clench had. Two specimens from islands not on the Crooked-Acklins Bank are excluded from the type-series. One of these, a female from West Plana Key, 16.iii.1976, collected by H. K. Clench, was originally included in Clench's type-series, but is not identical to Crooked or Acklins females and may represent another taxon. The second specimen, another female, is from Spencer's Point, Great Abaco, v.3.1909 (collected by W. W. Worthington). It, too, is not identical to specimens of *venus*, and it comes from an island on the Great Bahama Bank where one expects *M. bahamae* (Witt). The specimen could be mislabelled (Worthington was on Acklins in 1909 and collected *venus* there), or both *bahamae* and *intermedia* populations occur there. Additional Abaco material will be needed to determine the status of the *Memphis* species on the island.

This insect was locally abundant on both islands in 1979 and 1986. In 1988, when they were especially sought, almost none were encountered, and none came to fruit bait which attracted them in 1986. At Pinefield, Acklins, in 1979, many adults were collected on the stems of small shrubs (*Solanum* sp.) that grew near



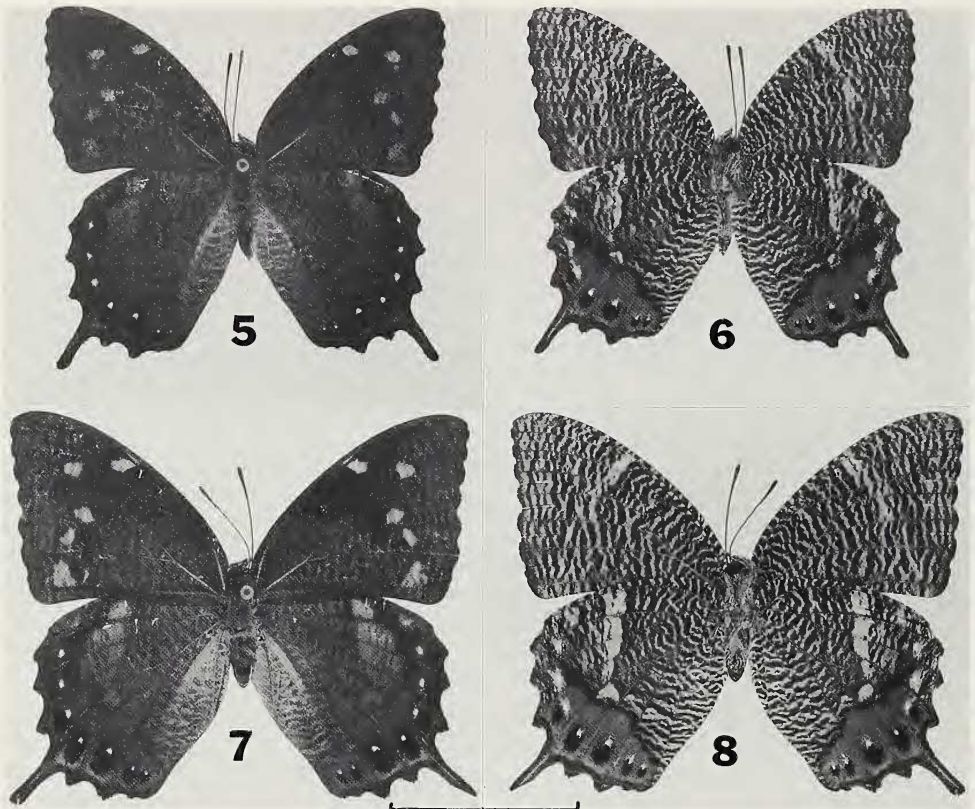


Fig. 5-8.—*Memphis intermedia mayaguanae*, n. subsp. 5-6. Holotype ♂, upper (5) and under (6) surfaces; BAHAMAS: Mayaguana I.: 0-3 mi N of Abrahams Bay, 29.ix.1987, M. Simon and L. Miller sta. 1987-16 (AME). 7-8. Paratype ♀, upper (7) and under (8) surfaces; same data as holotype (AME). Scale line = 20 mm.

the shore. These adults probed small wounds on the stems with their probosces, apparently feeding on fermented (?) secretions. Butterflies collected from such sites were often replaced by other individuals flying in a zig-zag, upwind direction, evidently locating the wounded plants by olfaction.

*Memphis intermedia mayaguanae*, new subspecies  
(Fig. 5-8)

*Description.*—**Male:** Upper surface ground color very dark, nearly as dark as that of *M. echemus* from Cuba, and much darker chestnut brown than in nominotypical *M. intermedia* from Great and Little Inagua, Turks and Caicos which it otherwise resembles closely. From *intermedia* the upper side further varies in the reduced forewing postmedian spots which furthermore are browner than in *intermedia*, these occasionally showing almost total obsolescence in spaces  $Cu_1$ - $Cu_2$  and  $Cu_2$ - $2A$ ; pale median shade toward apex of hindwing is usually more sharply delineated than in *intermedia*, and the paler submarginal white spots and black spots with white pupils toward the tornus of *intermedia* are even more strongly developed in this population.

Undersurface darker than in summer/autumn form *intermedia* and more like spring specimens from Great Inagua than autumn ones. The postmedian whitish shade on the hindwing is even more sharply delimited in Mayaguanan specimens, the olive subtornal patch is outlined basad with a deeper and more expanded chestnut shade that is more extensive than in Inaguan specimens; the submarginal spots and ocelli are more sharply defined in the present subspecies.



Male genitalia as in nominotypical *intermedia*.

Length of forewing of holotype male 26.7 mm; those of male paratypes range from 21.2 to 28.3 mm, averaging 25.3 mm.

**Female:** Upper and under surfaces differing from those of *intermedia* in the same characters as the male. The darker upperside ground color and the reduction in the postmedian spots on the upper forewing are particularly noticeable.

Length of forewing of female paratypes ranges from 27.4 to 32.7 mm, averaging 29.7 mm.

Described from 104 specimens, 70 males and 34 females from Mayaguana Island, Bahamas.

**Type material.**—Holotype male: BAHAMAS: **Mayaguana Island:** 0–3 mi N[orth] of Abrahams Bay, 29.ix.1987, at fruit bait (L. D. Miller and M. J. Simon). Paratypes: all **Mayaguana:** same data as holotype (20 males and 9 females); same locality as holotype, 30.ix.1987 (21 males and 5 females), 2.x.1987 (9 males and 4 females), 1.x.1987 (6 males and 2 females); vic. of Abrahams Bay, 28.ix.1987 (1 female); 3 mi S Mayaguana airport, 1.x.1987 (1 female); Abrahams Bay, 2.viii.1979 (1 female), 3.viii.1979 (2 males and 1 female), 4.viii.1979 (1 female), 7.viii.1979 (2 males); 1 mi N of Abrahams Bay, 7.viii.1979 (1 male); 2 mi N of Abrahams Bay, 3.viii.1979 (3 males and 2 females), 4.viii.1979 (4 males); 4 mi W of Abrahams Bay, 6.viii.1979 (1 male and 4 females).

**Disposition of type series.**—Holotype male, 45 male and 20 female paratypes, AME; 13 male and 12 female paratypes, CMNH; and 11 male and 2 female paratypes in collection of M. J. Simon.

**Etymology.**—The name refers to the this insect's island home and is a noun in the genitive case.

**Discussion.**—This subspecies is systematically much closer to *intermedia* than to *venus*, as would be expected. This is one instance where the Mayaguana material is demonstrably different from specimens from the Turks and Caicos islands (but see *Hemiargus thomasi* below). The new subspecies is very nearly as brown as Cuban *echemus*, a form with which it otherwise has nothing in common.

This abundant butterfly was very attracted to fruit bait, despite the fact that the week before *M. i. intermedia* was rare on Great Inagua and the few specimens seen were not attracted to bait. The butterflies would fly in the shade at a height of less than 1 m and were not shy, in contrast to the behavior of Inaguan specimens. Inhabitants of Abrahams Bay suggested that this butterfly was on the wing year-round.

#### Family Lycaenidae

##### *Chlorostrymon maesites maesites* (Herrich-Schäffer, 1864)

This species was recorded from Crooked and Mayaguana but not on Acklins, although the insect is an expected part of the fauna there. Most adults were taken on flowers of Black Mangrove, *Avicennia germinans* (L.) L.

**Localities.**—**Crooked:** vic. Colonel Hill, 17.vii.1979; *ca.* 1.5 mi W of Church Grove, 18.vii.1979. **Mayaguana:** Abrahams Bay, 2.viii.1979; *ca.* 2 mi N of Abrahams Bay, 3.viii.1979.

##### *Strymon martialis* (Herrich-Schäffer, 1864)

*Strymon martialis* is the commonest Hairstreak on these three islands. A number of adults were collected at *Avicennia* and a number of other flowers, including those of *Bidens*. On Mayaguana, a few specimens occurred on *Cordia* blossoms. This is the first record of the species from Acklins and Mayaguana.

**Localities.**—**Crooked:** *ca.* 2 mi W of Church Grove, 30.vii.1979; vic. Pitts Town, 22 and 26.ix.1986; 0–1 mi NW Landrail Point, 19.ix.1988; 2–4 mi E of Pitts Town, 24.ix.1986; 6 mi E of Pitts Town, 27.ix.1986; 2 mi E of True Blue, 19.ix.1988; ferry crossing at E end of island, 19, 20.ix.1988; 0–2 mi

E of Landrail Point, 9–12.v.1989. **Acklins:** Pinefield, 23.vii.1986; first record for the island; Snug Corner, 25 and 26.vii.1979; Delectable Bay, 26.vii.1979. **Mayaguana:** Abrahams Bay, 3, 4 and 7.viii.1979; first record from the island; 27.ix.1987; *ca.* 2 mi N of Abrahams Bay, 3.viii.1979; 0–3 mi N of Abrahams Bay, 28, 29, 30.ix, 1.x.1987; Pirates Well, 5.viii.1979; *ca.* 4 mi W of Abrahams Bay, 6.viii.1979; 3 mi S of Mayaguana airport, *ca.* 50 m elev., 30.ix.1987.

*Strymon columella cybira* (Hewitson, 1874)

This species was not common on Crooked, but more abundant on Acklins and Mayaguana. Specimens were collected from *Suriana* and *Croton* flowers on the latter two islands, and from *Lantana* on Mayaguana.

*Localities.*—**Crooked:** vic. Colonel Hill, 17.vii.1979; vic. Pitts Town, 23.ix.1986; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins:** Pinefield, 22, 23, 24.vii.1979; Delectable Bay, 26.vii.1979; vic. Spring Point, 27.vii.1979; Lovely Bay, 28.vii.1979. **Mayaguana:** Abrahams Bay, 2, 3, 4 and 7.viii.1979; first record for island; *ca.* 4 mi W of Abrahams Bay, 6.viii.1979; Pirates Well, 5.viii.1979; 0–3 mi N of Abrahams Bay, 28.ix.1987.

*Strymon acis armouri* Clench, 1943

This species is local on Acklins where it perched on foliage of *Croton* sp., its presumed larval foodplant, and was taken feeding on flowers of *Cordia* and *Bourreria*. In 1988, its presence was confirmed on Crooked (on eastern part of the island), where it was not abundant.

*Localities.*—**Crooked:** 2 mi E of True Blue, 19.ix.1988, first record for island; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins:** *ca.* 1.5 mi S of Pinefield, 24 and 25.vii.1979, first records for island; Anderson, 25.vii.1979.

*Electrostrymon angelia dowi* (Clench, 1941)

This species is found on all three islands, but the Crooked specimen was collected at Black Mangrove flowers, whereas butterflies from Mayaguana were found perching high in *Acacia* trees and engaging in mock combat.

*Localities.*—**Crooked:** *ca.* 1.5 mi W of Church Hill, 18.vii.1979; 0–1 mi NW Landrail Point, 19.ix.1988; 2 mi E of True Blue, 20.ix.1988; ferry crossing at east end of island, 19, 20.ix.1988; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins:** Snug Corner, 26.vii.1979, first record for island. **Mayaguana:** vic. Abrahams Bay, 27.ix.1987; first record for island; 0–3 mi N of Abrahams Bay, 28 and 29.ix and 1.x.1987.

*Leptotes cassius theonus* (Lucas, 1857)

This was the commonest lycaenid on all islands. On Acklins, oviposition was observed on the inflorescences of a red-flowered legume at Pinefield, and adults frequented *Cordia* and *Avicennia* flowers. On Crooked, adults visited many flowers, especially those of *Bidens*.

*Localities.*—**Crooked:** vic. Colonel Hill, 17, 20 and 29.vii.1979; Church Grove, 18.vii.1979; *ca.* 1.5 mi W of Church Hill, 18.vii.1979; *ca.* 2 mi W of Church Grove, 30.vii.1979; Fairfield, 20.vii.1979; ferry crossing, *ca.* 2 mi W of Browns, 21.vii.1979; vic. Pitts Town, 22, 23 and 26.ix.1986; vic. Landrail Point, 22.ix.1988; True Blue, 20.ix.1988; 2 mi E of True Blue, 20.ix.1988. **Acklins:** Pinefield, 22.vii.1979; *ca.* 1.5 mi S of Pinefield, 24.vii.1979; *ca.* 2 mi S of Hard Hill, 25.vii.1979; Harry Point, 26.vii.1979; Delectable Bay, 26.vii.1979; Snug Corner, 26.vii.1979; vic. Spring Point, 27.vii.1979. **Mayaguana:** Abrahams Bay, 2, 3 and 7.viii.1979 27.ix.1987; *ca.* 1 mi NE of Abrahams Bay, 2.viii.1979; *ca.* 2 mi N of Abrahams Bay, 3.vii.1979; 0–3 mi N of Abrahams Bay, 28.ix and 1.x.1987; *ca.* 4 mi W of Abrahams Bay, 6.viii.1979; Pirates Well, 5.viii.1979; 3 mi S of Mayaguana airport, 30.ix.1987.

*Hemiargus thomasi bahamensis* Clench, 1943

This subspecies of the highly variable *H. thomasi* is endemic to islands on the Crooked-Acklins bank. It is significantly different from nominotypical *thomasi*



from islands on the Great Bahama Bank, and also different from the populations on Mayaguana and Great Inagua. Despite assertions by Simon and Miller (1986: 7) that Inaguan material is nominotypical *thomasi*, Clench and Bjorndal (1980: 19) were correct in listing it as an “undescribed subspecies,” which is described below.

Oviposition on *Caesalpina* was recorded on Acklins. Adults visited flowers of *Suriana*, *Cordia*, *Avicennia* and *Bourreria*. The insect was not abundant in 1986 at the west end of Crooked, though it was very common there and on Acklins in 1979.

*Localities*.—**Crooked**: Church Grove, 18.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979; airport, ca. 2 mi SE of Colonel Hill, 19.vii.1979; Fairfield, 20.vii.1979; ferry crossing ca. 2 mi W of Browns, 21.vii.1979; vic. Pitts Town, 23.ix.1986; 2–4 mi E of Pitts Town, 23.ix.1986; 6 mi E of Pitts Town, 26 and 27.ix.1979; vic. Landrail Point, 21.ix.1988; 0–1 mi NW of Landrail Point, 19.ix.1988; 2 mi E of True Blue, 24.ix.1988; ferry crossing at east end of island, 19.ix.1988. **Acklins**: Pinefield, 22, 23 and 24.vii.1979; ca. 1.5 mi S of Pinefield, 24 and 25.vii.1979; Anderson, 25.vii.1979; ca. 2 mi S of Hard Hill, 25.vii.1979; Harry Point, 26.vii.1979; Delectable Bay, 26.vii.1979; Snug Corner, 26.vii.1979.

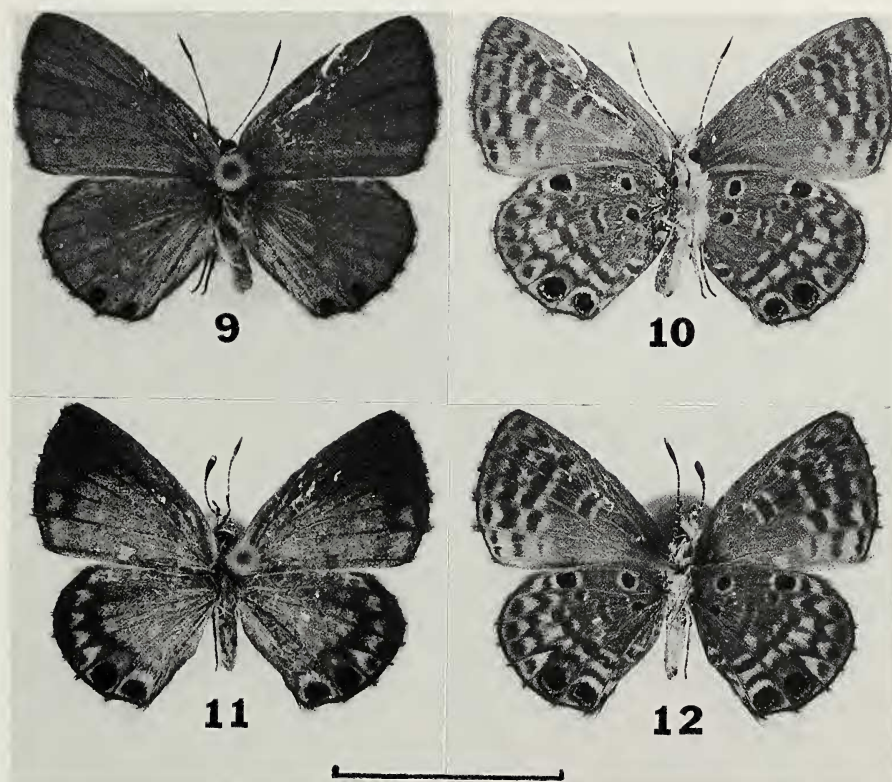


Fig. 9–12.—*Hemiargus thomasi clenchi*, n. subsp. 9–10. Holotype ♂, upper (9) and under (10) surfaces; BAHAMAS: Mayaguana I.: vic. Abrahams Bay, 28.ix.1987, M. Simon and L. Miller sta. 1987-15 (AME). 11–12. Paratype ♀, upper (11) and under (12) surfaces; BAHAMAS: Mayaguana I.: 0–3 mi N of Abrahams Bay, 30.ix.1987, M. Simon and L. Miller sta. 1987-17 (AME). Scale line = 10 mm.



*Hemiargus thomasi clenchi*, new subspecies  
(Fig. 9–12)

*Description.*—**Male:** Upper surface powdery blue with a narrow fuscous margin and conspicuous black submarginal points in hindwing cells  $Cu_1$ – $Cu_2$  and  $Cu_2$ –2A. There is no pink capping the former spot in either winter or summer specimens, despite Riley's (1975:110) assertion that summer brood males had such capping. Undersurface much darker than nominotypical *thomasi* (darker even than *bahamensis*) and with a more contrasting pattern than in any other subspecies. White spots on both wings crisply outlined; postdiscal band of hindwing narrow; hindwing subapical spot in  $Sc + R_1$ – $Rs$  very large, especially in Mayaguana specimens; hindwing submarginal spots in  $Cu_1$ – $Cu_2$  and  $Cu_2$ –2A very large and prominent, both outlined distally with silver and the spot in  $Cu_1$ – $Cu_2$  capped basally with orange; the third (and most posterior) basal spot is almost always absent; it is well developed in other subspecies. Fringes white, lightly checkered with black on both surfaces.

Male genitalia as in other subspecies of *thomasi*.

Length of forewing of holotype male 9.9 mm, those of male paratypes range from 7.7 to 10.5 mm, averaging 9.1 mm.

**Female:** Highly variable, ranging from extensive to almost no blue on upper surface. Upper surface blue as in male, but fuscous marginal lines broader than in that sex, extensive fuscous shading apically on forewing extending variably along costa; a second fuscous, submarginal shade parallels the marginal line on both wings, and the veins are darkened, giving the effect of a blue submarginal spotband; submarginal hindwing black spots large and bold as in male, with the one in  $Cu_1$ – $Cu_2$  capped basally with orange (Riley [1975:110] states that both spots are capped by orange, but there are no specimens from the southern Bahamas that confirm this statement). Undersurface as in male, but markings somewhat bolder.

Length of forewing of female paratypes ranges from 7.2 to 10.6 mm, averaging 9.0 mm.

Described from 55 specimens, 35 males and 20 females, from Mayaguana Island, Bahamas.

*Type material.*—Holotype male: BAHAMAS: **Mayaguana I[island]**: vic. Abrahams Bay, 28.ix.1987 (M. Simon & L. Miller), Sta. 1987-15. Paratypes: all from **Mayaguana**: same data as holotype (1 male and 1 female); 0–3 mi N of Abrahams Bay, 29.ix.1987 (1 male and 2 females), 30.ix.1979 (1 male and 3 females), 1.x.1987 (1 female); 2.x.1987 (1 male and 1 female); 3 mi S of Mayaguana airport, 1.x.1987 (11 males and 2 females); Abrahams Bay, 2.viii.1979 (3 males and 1 female), 3.viii.1979 (1 female), 7.viii.1979 (1 male); 1 mi N of Abrahams Bay, 3.viii.1979 (2 males and 2 females), 7.viii.1979 (1 male); 2 mi N of Abrahams Bay, 3.viii.1979 (1 male and 3 females); 1 mi NE of Abrahams Bay, 2.viii.1979 (5 males and 2 females); 4 mi W of Abrahams Bay, 6.viii.1979 (6 males and 3 females); Pirates Well, 3.viii.1979 (1 female).

*Disposition of type-series.*—Holotype male, 15 male and seven female paratypes, AME; 19 male and 13 female paratypes, CMNH.

*Etymology.*—The name is a patronym in honor of the late Harry K. Clench who made the study of Bahamian butterflies his lifelong interest and who contributed so much to our knowledge of them. He proposed that the species be named in honor of the man who originally kindled his interest in Lepidoptera, Mr. Don Thomas, who now resides in Dunedin, Florida.

*Discussion.*—This butterfly is common not only on Mayaguana, but also on both Inaguas and on the islands of Turks and Caicos. We have elected, however, to restrict the type series to specimens from Mayaguana to ensure that populations from other islands could be separated at some future date. Both the Allyn and Carnegie collections have a wealth of specimens from islands other than Mayaguana, but they do not seem to be different from specimens in the type series. This is, perhaps, the most distinctive of the races of *thomasi*. It is more heavily marked than the Hispaniolan subspecies, *noeli* Comstock and Huntington, and the undersurface ground color is as dark as that of *bahamensis*. As in most local populations of butterflies from the Inaguas, Mayaguana and Turks and Caicos, *clenchi* is a small insect; even the small form, *bahamensis*, has a full 1–1.5 mm

larger forewing. The Florida subspecies, *bethunebakeri* Comstock and Huntington, is the largest form of *thomasi*.

*Hemiargus t. clenchi* was the commonest lycaenid in the arid area south of the Mayaguana airport in 1987, and very nearly the only butterfly collected there.

We retain the traditional generic name *Hemiargus* with some reservation. This species is not similar to the type species of *Hemiargus*, *H. hanno* (Stoll), and may be attributable to Nabokov's (1945) genus *Cyclargus*. In the absence of a recent revision, we continue to use *Hemiargus* in the sense of Riley (1975). This taxonomic issue is being studied by Kurt Johnson (American Museum of Natural History).

*Brephidium exilis isophthalma* (Herrich-Schäffer, 1862)

This species was present on all three islands in suitable hypersaline environments. Adults nectared at *Borrchia* sp. and at *Conocarpus erectus* L.

*Localities*.—**Crooked**: ca. 1.5 mi W of Church Grove, 18.vii.1979; ferry crossing ca. 2 mi W of Browns, 21.vii.1979; 2 mi E of True Blue, 19.ix.1988; ferry crossing at east end of island, 19, 20.ix.1988. **Acklins**: Pinefield, 22, 23 and 24.vii.1979; Harry Point, 26.vii.1979; Delectable Bay, 26.vii.1979. **Mayaguana**: Abrahams Bay, 2, 3 and 7.viii.1979, including first records for island, 27.ix.1987.

Family Pieridae

*Ascia monuste eubotea* (Latreille, 1819)

Sight records were made on Crooked and near Abrahams Bay, Mayaguana. Previous records from Acklins are supported by specimens; *monuste* occurs on all three islands and is present in low density on Great Inagua (Simon and Miller, 1986:8).

*Phoebis sennae sennae* (Linnaeus, 1758)

This species was more common in 1989 than 1988 on Crooked, and, although sightings occurred at all localities, no specimens were collected. It was more common on Acklins than on Crooked and abundant on Mayaguana, where several examples were collected. They were nectaring on flowers of *Avicennia* on Acklins and visited *Stachytarpheta* flowers briefly near Landrail Point, Crooked.

*Localities*.—**Crooked**: Colonel Hill, 29.vii.1979; vic. Landrail Point, 22.ix.1988; ferry crossing at east end of island, 19.ix.1988. **Acklins**: Delectable Bay, 26 and 27.vii.1979. **Mayaguana**: Abrahams Bay, 27.ix.1987, first confirmed record for island; 0–3 mi N of Abrahams Bay, 29.ix and 1.x.1987.

*Phoebis agarithe antillia* F. M. Brown, 1929

This butterfly was common on all islands. It nectared at flowers of *Urechites lutea* (L.) Britt., *Bourreria ovata* and *Croton* sp., and was recorded on *Bougainvillea*, *Passiflora* sp. and *Bidens*.

*Localities*.—**Crooked**: vic. Colonel Hill, 17 and 28.vii.1979; vic. of airport, ca. 2 mi SE of Colonel Hill, 19.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979; ca. 2 mi W of Church Grove, 30.vii.1979; 1.5–2 mi W of Church Grove, 26.ix.1986; vic. Pitts Town, 23.ix.1986; 2–4 mi E of Pitts Town, 26.ix.1986; 6 mi E of Pitts Town, 24.ix.1986; vic. Landrail Point, 21, 22, 24.ix.1988; 0–1 mi NW Landrail Point, 19.ix.1988; 6 mi E of Landrail Point, 21.ix.1988; True Blue, 20.ix.1988; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins**: Pinefield, 22.vii.1979; ca. 1.5 mi S of Pinefield, 25.vii.1979; Anderson, 25.vii.1979; Delectable Bay, 26.vii.1979. **Mayaguana**: Abrahams Bay, 27.ix.1987; ca. 1 mi NE of Abrahams Bay, 2.viii.1979; first record for island; ca. 4 mi W of Abrahams Bay, 6.viii.1979; 0–3 mi N of Abrahams Bay, 29.ix and 1.x.1987.

*Kricogonia lyside* (Godart, 1819)

This species was abundant on Crooked and Acklins where a young larva was found feeding on *Lignumvitae* (*Guaiacum sanctum* L.). Adults visited flowers of *Avicennia*, *Bourreria*, *Cordia* and *Bidens*. On Mayaguana, *K. lyside* was not common, but present everywhere.

*Localities*.—**Crooked**: vic. Colonel Hill, 17, 19, 20 and 28.vii.1979; vic. of airport, ca. 2 mi SE of Colonel Hill, 19.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979; ferry crossing ca. 2 mi W of Browns, 21.vii.1979; vic. Pitts Town, 27 and 28.ix.1986; 0–1 mi NW of Landrail Point, 19.ix.1988, plus numerous sight records. **Acklins**: Pinefield, 22 and 23.vii.1979; ca. 1.5 mi S of Pinefield, 24.vii.1979; Anderson, 25.vii.1979; Snug Corner, 25 and 26.vii.1979; Delectable Bay, 26 and 27.vii.1979; vic. Spring Point, 27.vii.1979. **Mayaguana**: Abrahams Bay, 2.viii.1979; ca. 4 mi W. of Abrahams Bay, 6.viii.1979; 0–3 mi N of Abrahams Bay, 29 and 30.ix and 1.x.1987; 3 mi S of Mayaguana airport, 30.ix.1987.

*Eurema nicippe* (Cramer, 1779)

This species was not common on Crooked and Acklins and not seen on Mayaguana. The specimens from Crooked were on *Bidens* and *Stachytarpheta* flowers.

*Localities*.—**Crooked**: vic. Pitts Town, 22 and 27.ix.1986; first record for island; vic. Landrail Point, 21, 22.ix.1988. **Acklins**: Delectable Bay, 26.vii.1979; Snug Corner, 26.vii.1979.

*Eurema elathea* (Cramer, 1777)

This species, found on Acklins and Mayaguana, was not encountered on Crooked until 1988, even though we collected in the disturbed habitats it favors. It was closely associated with its putative foodplant, *Stylosanthes* sp. (Fabaceae).

*Localities*.—**Crooked**: vic. Landrail Point, 21.ix.1988, first record for island. **Acklins**: Pinefield, 24.vii.1979, first record for island; ca. 1.5 mi S of Pinefield, 24 and 25.vii.1979; Delectable Bay, 26 and 27.vii.1979; Snug Corner, 26.vii.1979. **Mayaguana**: Mayaguana airport, 8.viii.1979, first record for island.

*Eurema chamberlaini clenchi*, new subspecies

(Fig. 13–16)

*Description*.—**Male**: Upper surface orange, not quite so brilliant as in *mariguanae* and often with a ruddy flush; forewing with or without a trace of a fuscous cell-end spot; forewing marginal border variable and dentate basally; hindwing with only minute black points at ends of veins. Undersurface yellowish orange, except for a prominent whitish triangular area posteriad of the forewing cell, as mentioned by Riley (1975:121); almost unmarked, except for small brown spots at the anterior end of both fore- and hindwing cells and very faint fuscous speckles in hindwing disc; marginal reddish-orange lines on both wings very narrow and enclosing black points at ends of hindwing veins.

Length of forewing of holotype male 13.0 mm, those of male paratypes range from 13.1 to 17.1 mm, averaging 14.9 mm.

**Female**: Extremely variable; ground color yellow basad shading to pale orange distad, hindwing often solid, dull orange; with or without cell-end spot on forewing; and with or without fuscous forewing marginal border (often reduced to a series of chevrons near apex); with pink fringes on hindwing not commonly enclosing black points at ends of veins. Undersurface more orange than in male with more prominent fuscous cell-end spots than in that sex; a few faint fuscous postdiscal markings on hindwing; a prominent pinkish-brown apical hindwing patch; and fringes dark pink, occasionally enclosing black points at ends of hindwing veins.

Lengths of forewings of female paratypes range from 13.7 to 16.3 mm, averaging 14.7 mm.

Described from 94 specimens, 64 males and 30 females, from Crooked and Acklins islands, Bahamas.

*Type material*.—Holotype male: [BAHAMAS]: **Crooked Id.**: ca. 3 mi E Majors Cay, 20.iii. [1976] [H. K. Clench] sta. 308. Paratypes: **Crooked**: same data as holotype (2 males); NW end, nr. Pitts Town, 17.viii.1958, Robertson and Scott (1 male); Colonel Hill, 17.vii.1979 (3 males and 4 females), 20.vii.1979 (1 male);



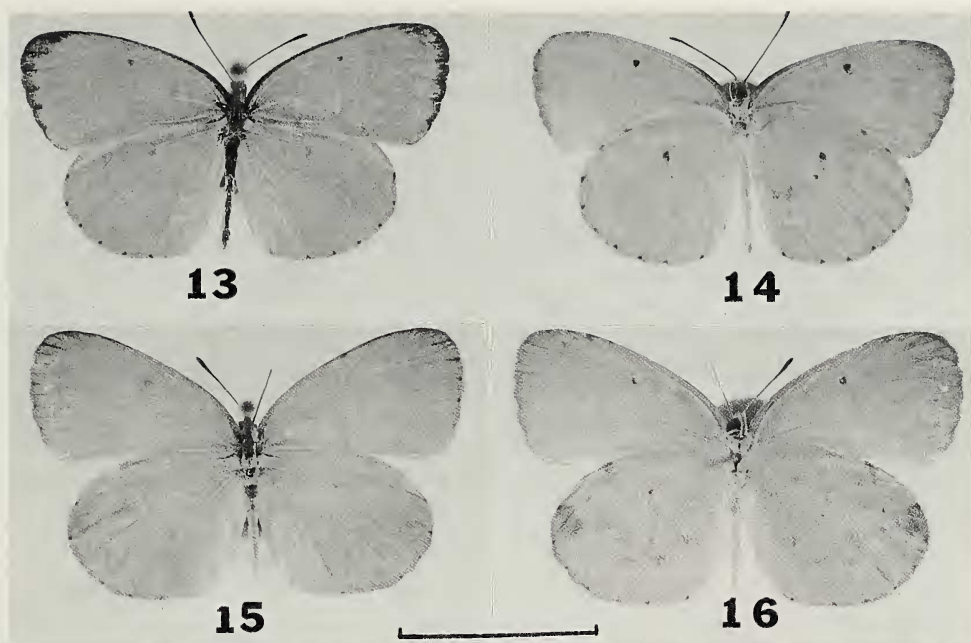


Fig. 13–16.—*Eurema chamberlaini clenchi*, n. subsp. 13–14. Holotype ♂, upper (13) and under (14) surfaces; BAHAMAS: Crooked I.: ca. 3 mi E of Majors Cay, 20.iii.1976, H. K. Clench sta. 308 (CMNH). 15–16. Paratype ♀, upper (15) and under (16) surfaces; BAHAMAS: Crooked I.: Colonel Hill, 17.vii.1979, D. J. Harvey (CMNH). Scale line = 10 mm.

Church Grove, 18.vii.1979 (4 males and 3 females); ca. 1.5 mi W of Church Grove, 18.vii.1979 (2 males and 3 females); 30.vii.1979 (1 male and 1 female); vic. airport, ca. 2 mi SE of Colonel Hill, 19.vii.1979 (1 male); Fairfield, 20.vii.1979 (3 females); ferry crossing, 2 mi W of Browns, 21.vii.1979 (1 female); vic. Pitts Town, 25.ix.1986 (1 male), 27.ix.1986 (1 male); 2–4 mi E of Pitts Town, 23.ix.1986 (1 male and 2 females), 24.ix.1986 (1 male); vic. Landrail Point, 21.ix.1988 (6 males), 22.ix.1988 (8 males and 2 females); 0–1 mi NW of Landrail Point, 19.ix.1988 (1 male); 0–2 mi E of Landrail Point, 9–12.v.1989 (4 males); Landrail Point, iii (2 males and 1 female); no further data, except date, iii (1 female). **Acklins:** Salina Point, 6.vi.1976 (1 male);  $\frac{3}{4}$ –2 mi S of Binnacle Hill settlement, 30.viii.1958 (1 female); Atwood Harbour, 18.vii.1974 (1 male); Pinefield, 22.vii.1979 (1 female), 23.vii.1979 (2 males and 3 females), 24.vii.1979 (3 males); Delectable Bay, 26.vii.1979 (6 males and 3 females), 27.vii.1979 (4 males and 1 female); Snug Corner, 26.vii.1979 (1 male); Spring Point, 27.vii.1979 (5 males).

*Disposition of type series.*—Holotype male, 38 male and 24 female paratypes, CMNH; 23 male and four female paratypes, AME; two male and one female paratypes in the American Museum of Natural History; one female paratype in the Museum of Comparative Zoology, Harvard University.

*Etymology.*—This species is named in honor of the late Harry K. Clench in recognition of his outstanding contributions to the knowledge of the Lepidoptera of the Bahamas.

*Discussion.*—The orange subspecies of *E. chamberlaini* from the southern Bahamas are subtly different from one another. They display different behavior on each bank of islands. The present subspecies, for example, is much more secretive

than are members of Inaguan, Mayaguanan or Turks and Caicos populations; by contrast, the Mayaguanan *mariguanae* (M. Bates) is ubiquitous, not retiring at all, and is found in much more open circumstances than is *clenchi* or even *inaguae* Munroe. On average, the present subspecies is larger than the other two, and all are larger than nominotypical *chamberlaini* from islands on the Great Bahama Bank. From *mariguanae*, females of the present subspecies are separable by their duller upper surface coloration which does not advertise the contrast between the basal-distal yellow to orange transformation that characterizes females of the Mayaguana butterfly. Inaguan specimens tend to be brighter and more orange in both sexes than in the present subspecies, but not so contrasting as in the Mayaguanan subspecies.

*Eurema chamberlaini mariguanae* M. Bates, 1934

This butterfly was seen ovipositing on unidentified legumes, perhaps a *Cassia* species. Adults were associated with flowers of *Croton*, but most were collected as they flew or were mating (the male is the transporting sex). This was the most common pierid on Mayaguana; its rarity in collections is a function of the remoteness of the island, and we suspect that it is abundant at all times.

Clench (MS) questioned the distinction between *mariguanae* and *inaguae* because he had seen only the female of *mariguanae*. Males are very similar in the two subspecies, *mariguanae* having, perhaps, slightly broader forewing fuscous borders. The females are remarkably different, however; those of *mariguanae* display a great contrast between the yellow basal and orange distal areas of both wings that is not shown in *inaguae*. Material from Turks and Caicos more closely resembles *mariguanae* than the Inaguan subspecies and is probably referable to it.

*Localities*.—**Mayaguana**: Abrahams Bay, 7.viii.1979, 27.ix.1987; *ca.* 1 mi NE of Abrahams Bay, 2 and 6.viii.1979; *ca.* 1 mi N of Abrahams Bay, 3, 4 and 7.viii.1979; 2 mi N of Abrahams Bay, 4.viii.1979; 0–3 mi N of Abrahams Bay, 28, 29 and 30.ix and 1.x.1987; *ca.* 4 mi W of Abrahams Bay, 6.viii.1979; 3 mi S of airport, 30.ix.1987; Pirates Well, 5.viii.1979.

*Eurema dina* subspecies  
(Fig. 17–18)

The presence of this species on Crooked Island was unexpected. The specimens are not typical of the Great Bahama Bank subspecies, *helios* M. Bates, and appear



Fig. 17–18.—*Eurema dina*, subsp.; BAHAMAS: Crooked I.: vic. Landrail Point, 22.ix.1988, L. Miller and M. Simon sta. 1988–58 (AME). Scale line = 10 mm.



to approach more closely the Cuban nominotypical subspecies. Two males were collected near Landrail Point in 1988; the butterfly was not seen in May of 1989.

*Localities.*—**Crooked:** vic. Landrail Point, 22.ix.1988; 6 mi E of Landrail Point, 21.ix.1988, first record for island.

*Eurema messalina* subspecies  
(Fig. 19–22)

The presence of this species on Crooked was also unexpected. *Eurema messalina* is known only from Cuba and the islands on the Great Bahama Bank. The Crooked specimens are not typical of the Bahamian subspecies, *E. m. blakei* (Maynard, 1891), as they more closely approach the nominotypical race from Cuba. Additional material is needed to ascertain the proper subspecific placement of this population.

*Localities.*—**Crooked:** 0–2 mi E of Landrail Point, 9–12.v.1989; first record for island.

Family Papilionidae  
*Heraclides andraemon bonhotei* (E. Sharpe, 1900)

This species is usually the most common swallowtail on these islands, although on Great Inagua *H. aristodemus* far outnumbers *andraemon* during its flight period. The present species visits flowers avidly and was taken on *Bougainvillea* and *Bidens* on Crooked and at flowers of *Bourreria* on Acklins. On Mayaguana all specimens were collected in flight.

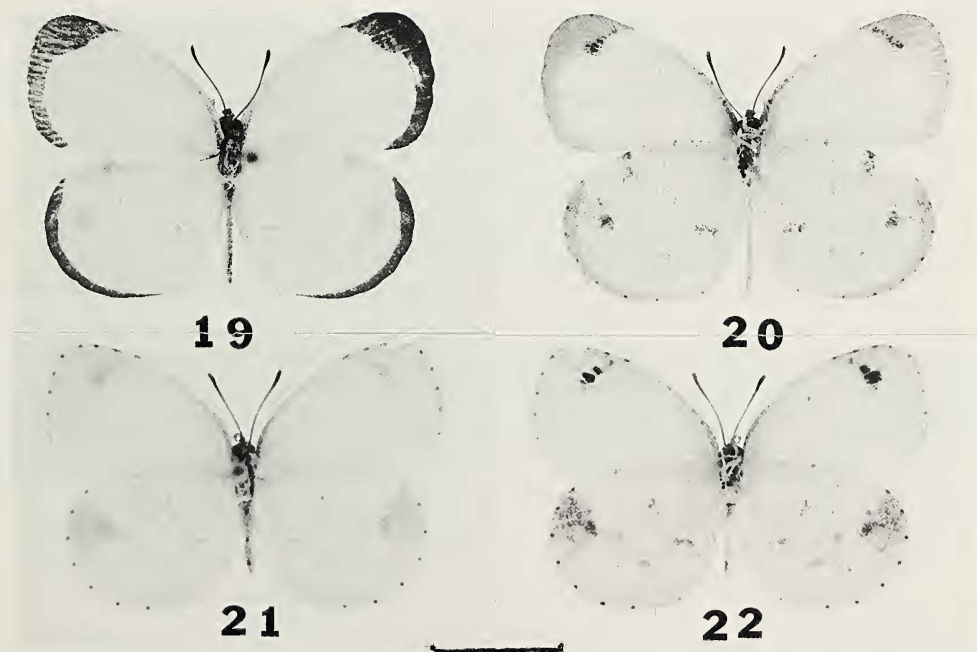


Fig. 19–22.—*Eurema messalina*, subsp. 19–20. ♂ upper (19) and under (20) surfaces; BAHAMAS: Crooked I.: vic. Landrail Point, 9–12.v.1989, M. Simon and R. Simon (AME). 21–22. ♀ upper (21) and under (22) surfaces; same data as ♂ (AME). Scale line = 10 mm.

*Localities.*—**Crooked:** vic. Colonel Hill, 17.vii.1979, first record for island; vic. Pitts Town, 22 and 23.ix.1986; 2–4 mi E of Pitts Town, 24.ix.1986; 6 mi E of Pitts Town, 24.ix.1986; vic. Landrail Point, 22, 24.ix.1988; 0–1 mi NW of Landrail Point, 19.ix.1988; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins:** Snug Corner, 26.vii.1979, first record for island. **Mayaguana:** 0–3 mi N of Abrahams Bay, 28, 29 and 30.ix and 1.x.1987, first records for island.

*Heraclides aristodemus majasi* L. Miller, 1987

Although this insect has been encountered only near Landrail Point on Crooked, there is abundant suitable habitat throughout the western half of the island, and *majasi* surely will be found farther east (Miller, 1987). Furthermore, although this species has been captured only on Crooked to date, we have little doubt that it will be found on Acklins (but Clench, MS, suggests that Acklins does not have the proper hammock forests) and perhaps other islands of the Crooked-Acklins Bank. Surprisingly, *majasi* was not encountered at all during September of 1988, even though there had been abundant rains. Additional specimens were found in May 1989, including the first female. As had been expected, this specimen differed from the male only in size. One specimen of the type series was visiting the flowers of *Bidens* in the middle of Landrail Point.

*Localities.*—**Crooked:** vic. Pitts Town, 27.ix.1986; 2–4 mi E of Pitts Town, 23 and 24.ix.1986; first records for island; 0–2 mi E of Landrail Point, 9–12.v.1989.

*Heraclides aristodemus bjorndalae* (Clench, 1979)

This species was described from Great Inagua from a pair of specimens that for several years remained the only known material from the island. Subsequently, a number of specimens were collected on North Caicos and on Grand Turk on separate banks, indicating a somewhat higher vagility for this form than that displayed by most *aristodemus*.

All of the specimens collected were either in deep scrub or on trails bordering the scrub. The larval foodplant, *Amyris elemifera* L. (Torchwood) was everywhere, but because it was sere, no specimens of *aristodemus* were found in the best stand of Torchwood. The insects were common in the scrub near Abrahams Bay.

*Localities.*—**Mayaguana:** 0–3 mi N of Abrahams Bay, 30.ix.1987, first record for island; 1.x.1987.

Family HesperIIDae

*Phocides pigmalion batabanoides* (Holland, 1902)

None of us encountered this skipper on Crooked until 1988. Harry Clench collected a single female at Majors Cay, east of our collecting localities, and intended to use this specimen as the type of a new subspecies from the island. A sighted specimen at Landrail Point on 22 September 1986 could not be captured, but one was collected in 1989 when the flight was larger. The characters of this specimen suggest that Clench's assessment of its distinct subspecific status may have been erroneous; consequently, we refer it to the Bahamian subspecies pending capture of additional material.

*Localities.*—**Crooked:** vic. Landrail Point, 22.ix.1988.

*Epargyreus zestos inaguarum* Clench and Bjorndal, 1980

The records cited here considerably extend the known range of this subspecies. The northern Bahamas are uniformly inhabited by the nominotypical subspecies, and the species has not been reported from the Turks and Caicos islands. Material



from Crooked and Acklins is somewhat intermediate between *inaguarum* and the nominotypical race, but there are more characteristics that unite the Crooked and Acklins specimens with the Inaguan subspecies. The specimens from Mayaguana are indistinguishable. Most specimens have been taken on *Cordia* flowers.

*Localities.*—**Crooked:** vic. Colonel Hill, 17, 19, 20 and 28.vii.1979, first record for island; vic. Pitts Town, 22 and 24.ix.1986; 2–4 mi E of Pitts Town, 27.ix.1986; 6 mi E of Pitts Town, 23 and 25.ix.1986; vic. Landrail Point, 22.ix.1988; 0–1 mi NW of Landrail Point, 19.ix.1988; 6 mi E of Landrail Point, 21.ix.1988; 2 mi E of True Blue, 19, 20.ix.1988; ferry crossing at east end of island, 19, 20.ix.1988; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins:** Anderson, 25.vii.1979, first record for island; vic. Spring Point, 27.vii.1979. **Mayaguana:** 0–3 mi N of Abrahams Bay, 29 and 30.ix.1987, first records for island.

*Polygonus leo savigny* (Latreille, 1822)

This species is secretive, with most specimens collected while they were perched under leaves along forest trails. These records are the southernmost for the species in the Bahamas.

*Localities.*—**Crooked:** vic. Colonel Hill, 17, 19, 20, 28 and 29.vii.1979, first record for island; Church Grove, 18.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979; ferry crossing ca. 2 mi W of Browns, 21.vii.1979; vic. Pitts Town, 24 and 27.ix.1986; 6 mi E of Pitts Town, 25.ix.1986; vic. Landrail Point, 22.ix.1988; 2 mi E of True Blue, 19, 20.ix.1988.

*Urbanus proteus domingo* (Scudder, 1872)

Locally common on Crooked, it was taken once on Acklins. Most specimens were collected on flowers of a cultivated *Bougainvillea*, but in 1988, individuals were very much attracted to the flowers of *Stachytarpheta*. All were collected in more or less disturbed environments, not unusual for such a “weedy” butterfly.

*Localities.*—**Crooked:** vic. Colonel Hill, 17, 19, 20, 28 and 29.vii.1979; vic. Pitts Town, 23.ix.1986; 2–4 mi E of Pitts Town, 26.ix.1986; vic. Landrail Point, 22.ix.1988; 2 mi E of True Blue, 21, 22.ix.1988; ferry crossing at east end of island, 20.ix.1988. **Acklins:** Anderson, 25.vii.1979.

*Ephyriades brunnea brunnea* (Herrich-Schäffer, 1864)

This was probably the most common hesperiid on these islands, although the population density was much lower on Mayaguana in September and October 1987, than elsewhere. Specimens were taken at flowers of *Cordia*, *Bourreria* and *Bidens*, but most individuals remained deep in the shade of coppices. A few specimens were collected at flowers of cultivated *Bougainvillea*, nectaring only on the shaded parts of the vine.

*Localities.*—**Crooked:** vic. Colonel Hill, 17, 20, 28 and 29.vii.1979; Church Grove, 18.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979; vic. of airport, ca. 2 mi SE Colonel Hill, 19.vii.1979; Fairfield, 20.vii.1979; ferry crossing ca. 2 mi W of Browns, 21.vii.1979; vic. Pitts Town, 22, 23, 24 and 25.ix.1986; 2–4 mi E of Pitts Town, 23.ix.1986; 6 mi E of Pitts Town, 23.ix.1986; vic. Landrail Point, 22.ix.1988; 6 mi E of Landrail Point, 21.ix.1988; 0–1 mi NW of Landrail Point, 19.ix.1988; Crooked Island airport, 19.ix.1988; True Blue, 20.ix.1988; 0–2 mi E of Landrail Point, 9–12.v.1989. **Acklins:** Pinefield, 23.vii.1979; ca. 1.5 mi S of Pinefield, 25.vii.1979; Anderson, 25.vii.1979; Delectable Bay, 26.vii.1979; Lovely Bay, 28.vii.1979. **Mayaguana:** Abrahams Bay, 7.viii.1979; ca. 1 mi N of Abrahams Bay, 3, 4 and 7.viii.1979; 0–3 mi N of Abrahams Bay, 28, 29 and 30.ix and 1.x.1987; Pirates Well, 5.viii.1979.

*Hylephila phyleus phyleus* (Drury, 1773)

A few specimens were collected on Crooked and Acklins in 1979; the species was common in 1988. One specimen was taken while it was nectaring on *Borrichia* flowers on Acklins, whereas individuals avidly visited *Stachytarpheta* flowers.

*Localities.*—**Crooked:** vic. Colonel Hill, 20.vii.1979; vic. of airport, ca. 2 mi SE of Colonel Hill, 19.vii.1979; ferry crossing ca. 2 mi W of Browns, 21.vii.1979; ca. 2 mi W of Church Grove, 30.vii.1979; vic. Landrail Point, 22.ix.1988; 2 mi E of True Blue, 19, 20.ix.1988; Crooked Island airport, 19.ix.1988; ferry crossing at east end of island, 19, 20.ix.1988. **Acklins:** Anderson, 25.vii.1979, first record for island.

### *Wallengrenia* species

This skipper is being described by J. Y. Miller (AME). It is endemic to the southern Bahamas and was not common on Crooked (about as rare as on Great Inagua), more common on Acklins and abundant on Mayaguana. It is readily distinguishable from the northern Bahamian species (*misera* [Lucas]) by the fiery coloration in both sexes. Specimens were taken at flowers of *Bidens*, *Avicennia* and *Bourreria*. This skipper is an extraordinarily shy species, not at all like its congeners on the mainland or in Puerto Rico.

*Localities.*—**Crooked:** Fairfield, 20.vii.1979, first record for island; 2–4 mi E of Pitts Town, 23.ix.1986; 6 mi E of Pitts Town, 23.ix.1986; vic. Landrail Point, 21, 22, 24.ix.1988; 0–1 mi NW of Landrail Point, 19.ix.1988; 6 mi E of Landrail Point, 21.ix.1988; 2 mi E of True Blue, 19, 24.ix.1988. **Acklins:** Pinefield, 22.vii.1979; ca. 1.5 mi S of Pinefield, 24 and 25.vii.1979; Anderson, 25.vii.1979; ca. 2 mi S of Hard Hill, 25.vii.1979; Snug Corner, 26.vii.1979; Delectable Bay, 27.vii.1979. **Mayaguana:** Abrahams Bay, 7.viii.1979, 27.ix.1987 (LDM and MJS); ca. 1 mi NE of Abrahams Bay, 2 and 6.viii.1979; first record for island; ca. 1 mi N of Abrahams Bay, 3, 4 and 7.viii.1979; 0–3 mi N of Abrahams Bay, 28, 29 and 30.ix and 1.x.1987.

### *Euphyes cornelius cornelius* (Latreille, 1824)

Evans (1955) described the subspecies *agra* from material collected presumably from New Providence Island by Sir G. Carter. It occurs on islands of the Great Bahama Bank, and differs from Cuban nominotypical *cornelius* in having reduced hyaline markings on the forewing and no under hindwing pale spotting. Crooked and Acklins *cornelius* are inseparable from Cuban specimens and bear no resemblance to *agra* in the salient points. We do not believe that the Cuban subspecies has been reported previously from the Bahamas and suspect that it is restricted in the Bahamas to islands of the Crooked-Acklins bank.

On Crooked in September 1986, and again in 1988, hundreds of individuals were avidly sipping nectar in a weedy field of sand spurs intermixed with blooming *Stachytarpheta*. *Euphyes cornelius* was the most common butterfly there, and most *Stachytarpheta* plants had two or more *cornelius* nectaring on the same inflorescence. Elsewhere, the insect was encountered singly.

*Localities.*—**Crooked:** vic. Colonel Hill, 17, 20, 28 and 29.vii.1979; ca. 1.5 mi W of Church Grove, 18.vii.1979; 1.5–2 mi W of Church Grove, 26.ix.1986; vic. Pitts Town, 22, 23, 26 and 27.ix.1986; 2–4 mi E of Pitts Town, 26 and 27.ix.1986; 6 mi E of Pitts Town, 25 and 27.ix.1986; vic. Landrail Point, 21, 22.ix.1988; 0–1 mi NW of Landrail Point, 19.ix.1988; Crooked Island airport, 19.ix.1988; True Blue, 20.ix.1988; 2 mi E of True Blue, 19, 20.ix.1988; ferry crossing at east end of island, 20.ix.1988. **Acklins:** ca. 1.5 mi S of Pinefield, 25.vii.1979, first record for island; Delectable Bay, 26.vii.1979.

### *Panoquina panoquinoides panoquinoides* (Skinner, 1891)

This skipper is characteristic of, but not restricted to, hypersaline environments. *Panoquina panoquinoides* is never common outside these environments, though the Mayaguana population seemed larger than those on the other two islands. Specimens occurred at flowers of *Borrichia*, and were taken at *Cordia*, *Stachytarpheta* and *Phyla* flowers.

*Localities.*—**Crooked:** 6 mi E of Pitts Town, 23 and 25.ix.1986; ferry crossing at east end of island, 19, 20.ix.1988; 2 mi E of True Blue, 19, 24.ix.1988; salina W of True Blue, 19.ix.1988. **Acklins:**



Pinefield, 22, 23 and 24.vii.1979, first records from island; Anderson, 25.vii.1979; Delectable Bay, 27.vii.1979. **Mayaguana:** Abrahams Bay, 4 and 7.viii.1979, first records for island; vic. Abrahams Bay, 27.ix.1987; 0–3 mi N of Abrahams Bay, 28 and 29.ix.1987.

### DISCUSSION

Islands of the northern Bahamas lie mostly on the Great Bahama Bank, or on the Little Bahama Bank (Grand Bahama and the Abacos). The only exception is San Salvador, which is isolated on a separate bank. During glacial maximum in the Pleistocene, the myriad northern Bahamian islands were connected into three very large islands (Fig. 23), one of which very nearly reached northcentral Cuba. The relatively recent connection of the northern Bahamas into a larger island leads us to question the existence of several separate subspecies on the northern Bahamian islands, particularly the subspecies of *Eurema chamberlaini*; these populations are likely to have been connected as little as 10,000 years ago. Burke (1988) stated further that Cuba completely overrode the Bahamas Platform during the Miocene (the igneous Cuban rocks are underlain by older Bahamian carbonates). If one assumes that any of the Bahamas were emergent at the time, there could have been direct connection and faunal interchange between the islands. Ramos' (personal communication, 1989) analysis of the hesperiid faunas of the Antilles has shown that Cuban and Bahamian skippers are highly correlated, perhaps reflecting the Cuban-Bahamian Miocene vicariance event.

Biogeographical examination of the rhopaloceran fauna of the southern Bahamas reveals certain patterns. Simply listing the species for each island can be misleading because the large number of widespread monomorphic species effectively reduces the proportion of endemics. We propose to identify such widespread species and discard them in biogeographic analyses, a technique perfected by Rosen (1975). Such species must be effective dispersalists, and the resulting constant genetic exchange between populations would preclude development of interpopulational differences.

#### *Widespread Species*

The nominotypical subspecies of *Euptoieta hegesia* inhabits the Antilles and the Bahamas, although specimens from Puerto Rico have been separated as the subspecies *watsoni* by Comstock (1944). In the area considered in this paper, *hegesia* has been collected on all of the islands of the southern Bahamas, and those of Turks and Caicos.

*Euptoieta c. claudia* is found in small colonies in the Greater Antilles and the Bahamas, but only on Great Inagua in our area (Clench and Bjørndal, 1980). This species is a well-known dispersalist on the North American mainland (see for example, Howe, 1975:210), and migrants doubtless often founded temporary populations in the Bahamas.

*Vanessa cardui* is the most cosmopolitan butterfly in the world (Howe, 1975:205). It is not surprising, therefore, that occasional colonies of this strong flier have been founded in the Antilles and Bahamas, but in our area *cardui* was found only once on Great Inagua (Simon and Miller, 1986).

*Junonia genoveva* has been recorded from southern Florida, the southern Bahamas and the Greater Antilles. It, too, is a monomorphic species. Hispaniolan specimens were previously misidentified and segregated as the subspecies *michaelis* of *J. evarete* by Munroe (1950). Turner and Parnell (1985:144) have explained the synonymy of these insects.





*Junonia evarete zonalis* is found unchanged in the Antilles and the Bahamas, though only on Great Inagua thus far in the southern islands (Clench and Bjorndal, 1980).

*Chlorostrymon m. maesites* is a widespread butterfly that ranges from Florida to the northern Lesser Antilles and has been found on Crooked and Mayaguana, as well as on Turks and Caicos.

*Strymon martialis* likewise occurs in southern Florida, the Bahamas and the Greater Antilles. It was found on all islands under consideration here and is monomorphic.

*Strymon columella cybira* is the Bahamian and Greater Antillean representative of a widely distributed hairstreak. The Florida subspecies, *modesta* (Maynard), has been recorded from islands of the Little Bahama Bank (Clench, MS).

*Leptotes cassius theonus* is another abundant, more or less undifferentiated subspecies in Florida, the Bahamas and the Greater Antilles.

*Brephidium exilis isophthalma* is known from the Bahamas and the Greater Antilles; it was collected on all islands covered in this work.

*Phoebis s. sennae* is found throughout the West Indies, although a few specimens from the northern Bahamas are referable to the eastern North American subspecies *eubule* (Linnaeus). It is a well-documented migrant (Williams, 1958), and its presence on all of the islands covered here is not surprising.

A similar pattern obtains for *Phoebis agarithe antillia*, which was found on all islands sampled.

*Kricogonia lyside* is found throughout the Caribbean, in northern South America, and thence northward to the southern United States. It is strongly migratory (evident from the many reports in the "Season Summary" [*News of the Lepidopterists' Society*]) and was very common on all of the islands sampled.

A like pattern exists in *Eurema nicippe*, but that species has been found only on Crooked, Acklins and Great Inagua; its apparent absence on Mayaguana probably is an artifact of inadequate collecting.

*Eurema elathea* is a "domesticated" butterfly, frequently found in urban environments, and it is known from throughout the Antilles and neotropical continental America. It was found on all of the islands sampled, usually in urban situations.

*Urbanus proteus domingo* is found throughout the West Indies, including the Bahamas. It is known from Crooked and Acklins (common) and Great Inagua (one record, Simon and Miller, 1986; but absent the following year). These data suggest that this butterfly is migratory and may establish transient colonies in the islands.

*Pyrgus oileus* is an abundant Neotropical species that is represented by the nominotypical race in the northern Neotropics, the Greater Antilles and Great Inagua.

*Hylephila p. phyleus* is common throughout most of the Neotropics, and is found on Great Inagua (Simon and Miller, 1986), Crooked and Acklins.

*Panoquina p. panoquinoides* is found in Florida and the northern West Indies, including the Bahamas.

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←  
Fig. 23.—Map of the Bahamas and their surroundings. Present-day landmasses are shown in black; the gray areas are those areas that would have been emergent during glacial maximum and are the areas covered by less than 100 m of water. Note the coalescence of the islands of the Great and Little Bahama Banks and the remaining isolation of the southern Bahama islands.

As such, 19 of the species recorded from Crooked, Acklins, Mayaguana and the Inaguas are widely distributed, monomorphic, apparently vagile species that are of limited use in biogeographic analysis. These species amount to 45.2% of the butterfly fauna of these islands that is attributable to dispersal in the classic Matthew-Darlington mode. This figure agrees with the 50% dispersalist species postulated for the entire West Indies (Miller and Miller, 1989).

### Endemics

Individual islands show some interesting patterns of endemism. Of the 33 species recorded from Crooked, 16 (48.5%) are widespread as defined here. Of the 26 species recorded from Acklins, 14 (53.9%) are effective dispersalists. The observed differences are probably only a reflection of the collecting done on Acklins. Further sampling of the fauna should equalize the faunal records of Crooked and Acklins toward the lower percentage because the two islands share the same bank.

Mayaguana has records for 22 species (excluding the sight record of *Hamadryas feronia diasia*, but including a sight record of the expected *Ascia monuste*). Twelve of these species (54.5%) are widespread and vagile, and perhaps the preponderance of such taxa reflects the relative long term inaccessibility of that island. Only the strongest flyers could colonize Mayaguana.

Great Inagua, the largest island of the four, has records of 37 butterfly species (excluding the one very questionable *Ephyriades zephodes* record cited by Clench and Bjorndal, 1980). Of these, 17 (46%) are of ubiquitous taxa. The Inaguan environment is so dry that the presence of a greater number of endemic taxa than one might expect is indeed strange.

If the widespread, but geographically variable, *Ascia monuste* is included in the widely ranging species category (it was not since we have records of two subspecies from the Bahamas), the figures would be skewed slightly more toward dispersalist species.

These data suggest that the same mechanisms that apply to the remainder of the West Indies are at work in the southern Bahamas, if only on a smaller scale. Therefore, a vicariance model should explain the composition of the fauna of these islands. Accordingly, the endemic faunal elements should be examined more closely. The endemic taxa and their distributions are summarized in Table 1.

These data show that significant numbers of butterfly species are either Bahamian endemics (ones held in common with more northerly islands), or they are Cuban species. The endemic pattern can be ascribed to interisland dispersal, presumably during the Pleistocene when sea levels were much lower, and the banks not separated by so much distance. Very few butterflies in the southern Bahamas have affinities with Hispaniolan populations, and none show nearest relationships to Puerto Rican or Jamaican stocks. The occurrence of Cuban species involves relationships of southern Bahamian stocks only to those from other southern Bahamas islands.

Those species held in common with the northern Bahamas reflect distributions on the Great Bahama Bank with spillovers onto the southern islands. These butterflies almost certainly are Pleistocene arrivals from the Bahamian "super island" that existed as little as 10,000 years ago. Their presence in the southern Bahamas is expected. Such taxa include *Ephyriades brunnea brunnea*, *Heraclides andraemon bonhotei*, *Electrostrymon angelia dowi*, *Dryas iulia carteri* and *Marpesia eleuschea bahamensis*.

Table 1.—Distribution of butterfly subspecies showing endemism in the southern Bahamas. Abbreviations are as follows: *D. plexippus* (*p* = plexippus, *m* = megalippe); *D. gilippus* (*b* = berenice, *c* = cleothera); *D. iulia* (*cil* = cillene, *car* = carteri, *h* = hispaniola); *A. jatrophae* (*g* = guantanamo, *s* = saturata); *M. eleuthera* (*e* = eleuthera, *b* = bahamensis, *d* = dospassosi); *M. intermedia* (*v* = venus, *m* = mayaguanae, *i* = intermedia); *S. acis* (*c* = casasi, *a* = armouri, *l* = leucostricha, *p* = petioni); *E. angelia* (*a* = angelia, *d* = dowi, *b* = boyeri); *H. hanno* (*f* = filenus, *c* = ceraunus); *H. thomasi* (*bb* = bethunebakeri, *t* = thomasi, *b* = bahamensis, *c* = clenchi, *n* = noeli); *A. monuste* (*e* = eubotea, *p* = phileta); *E. lisa* (*e* = euterpe, *l* = lisa); *E. chamberlaini* (*c* = chamberlaini, *cl* = clenchi, *m* = mariguanae, *i* = inaguae); *E. dina* (*d* = dina, *h* = helios, *m* = mayobanex); *E. messalina* (*m* = messalina, *b* = blakei); *H. andraemon* (*a* = andraemon, *b* = bonhotei); *H. aristodemus* (*t* = temenes, *p* = ponceanus, *m* = majasi, *b* = bjorndalae, *a* = aristodemus); *P. pigmalion* (*b* = batabano, *bs* = batabanoides, *bi* = bicolor); *E. zestos* (*z* = zestos, *i* = inaguarum); *P. leo* (*s* = savigny, *i* = ishmael); *Wallengrenia species* (*m* = misera, *d* = drury); *E. cornelius* (*c* = cornelius, *a* = agra). For further details, see discussions in text.

Taxon	Cuba	northern Bahamas	Crooked	Acklins	Maya- guana	Inaguas	Turks & Caicos	His- pan- iola
<i>D. plexippus</i>	p	p	p			m		m
<i>D. gilippus</i>	b	b				b	b	c
<i>D. iulia</i>	cil	car	car					h
<i>A. jatrophae</i>	g	g				s	?	s
<i>M. eleuthera</i>	e	b	b	b				d
<i>M. intermedia</i>			v	v	m	i	i	
<i>S. acis</i>	c	a	a?	a?		ssp?	l	p
<i>E. angelia</i>	a	d	d	d				b
<i>H. hanno</i>	f					c	c	c
<i>H. thomasi</i>		bb, t	b	b	c	c	c	n
<i>A. monuste</i>	e	p, e	e	e	e	e	e	e
<i>E. lisa</i>	e	l, e				e	e	e
<i>E. chamberlaini</i>		c	cl	cl	m	i	m	
<i>E. dina</i>	d	h	d?					m
<i>E. messalina</i>	m	b	m?					
<i>H. andraemon</i>	a	b	b	b	b	b	b	
<i>H. aristodemus</i>	t	p	m	m?	b	b	b	a
<i>P. pigmalion</i>	b	bs	bs?					bi
<i>E. zestos</i>	z	z	i	i	i	i	?	z
<i>P. leo</i>	s	s	s					i
<i>Wallengrenia</i>								
<i>species</i>	m	m	spl	spl	sp2	sp2	sp2	d
<i>E. cornelius</i>	c	a	c	c				

A far more interesting pattern of distribution involves those species that have the same subspecies on Crooked (and perhaps Acklins) and on Cuba. The only other island that shows such an affinity to Cuba is Andros (Clench, 1977; Harvey and Peacock, 1989), and there are several taxa on Crooked that are different from the subspecies on Andros. That island, by contrast, has several Cuban endemics that have not reached Crooked. All of these similarities with Cuba can be explained best by a vicariance scenario such as that proposed by Burke (1988) who stated that Cuba completely overrode the Bahamas Platform during the Tertiary. There are Cenozoic carbonates underlying the much older Cuban igneous material, and these are presumed to be part of a stable Bahamas Rise over which Cuba was thrust. A contrasting view involving Cenozoic over-water dispersal has been given by many authors, such as Schwartz (1967), but the vicariance model explains the present-day distribution better (see Miller and Miller, 1989, for a discussion of the antiquity of some butterfly groups).

Cuba has contributed several taxa to Andros, such as *Eurema laeae* (Herrich-Schäffer) and *Wallengrenia misera* (Lucas), but there are several other instances



of different subspecies on Andros and Cuba. Cases in point include *Euphyes cornelius*, *Eurema dina*, *Eurema messalina*, *Calisto herophile* and *C. sibylla*. The first three of these insects are common to Crooked and Cuba, or are nearly so. If the cases were somewhat more clearcut, we could state with greater certainty that the vicariance event mentioned above was responsible for the current faunal distribution. The best candidate for a vicariant species is *Euphyes cornelius cornelius*, although it is not quite typical of the Cuban subspecies. Although the northern Bahamian *E. c. agra* Evans does not occur on Crooked and Acklins, some Cuban examples are even more heavily spotted with white than Bahamian specimens. A similar situation obtains for the populations of the two *Eurema*: they are not quite typical of either the Bahamian or the Cuban subspecies.

A third, very puzzling distribution involves Great Inagua. Its subspecies of *Anartia jatrophae* is the Hispaniolan *saturata* Röber, not the Cuban, northern Bahamian and Floridian *guantanamo*. The latter, however, does not occur on any of the other southern Bahamian islands, so perhaps *saturata* was distributed by recent waif dispersal or perhaps a series of short Pleistocene hops across now submerged islands to the south and east of the Turks Islands (Mouchoir Reef, Silver Rock, Navidad Bank, etc.; Fig. 23). A similar pattern seems to involve the single specimen of *Strymon acis* known from Great Inagua: phenotypically it is closest to the Hispaniolan subspecies, *petioni* (W. P. Comstock and Huntington), as stated by Simon and Miller (1986), rather than to the northern Bahamian one.

The final pattern is one that involves shared endemism on the southern Bahamian islands. This pattern suggests that banks, Pleistocene paleo-islands (Fig. 23), have had more influence on butterflies than previously thought. For example, both Crooked and Acklins harbor *Eurema chamberlaini clenchi*, whereas Mayaguana and the islands of Turks and Caicos have *E. c. mariguanae*, and *E. c. inaguae* Munroe is endemic in the Inaguas. These subspecies, although closely related, are not identical, and the populations can be discriminated when a series of each is examined.

A similar pattern exists with *Heraclides aristodemus*. Crooked (and perhaps Acklins) has *H. a. majasi*, but Mayaguana, North Caicos and at least Great Inagua (perhaps also Little Inagua) share the very distinctive *H. a. bjorndalae* (Clench).

A parallel pattern is demonstrated in *Hemiargus thomasi*. Perhaps these populations arose by chance dispersal fairly recently, or more likely, they arrived by a much older vicariance event.

A plausible scenario involves Crooked Island-Cuba abutting the Bahamas Rise, then rebounding to its present position, as suggested by Burke (1988). This event could have left some Cuban species stranded on Crooked, and these have remained isolated. It is odd, however, that more Cuban immigrants, such as members of the hesperiid genus *Burca*, which shows some predilection for xeric habitats, did not become established there. The genus is firmly established on Long Island about 50 mi (80 km) to the north, and on other islands on the Great Bahama Bank.

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### ADDENDUM

The following description of a new subspecies of *Strymon acis* was found in Harry Clench's papers several years ago, but it was not until recently that the type series of the butterfly was discovered. Clench had labelled only one specimen, his choice for the holotype; the other specimens have been labelled by the authors. The new subspecies is very distinctive and deserves description. Notes interjected by us appear in brackets.



Fig. 24-27.—*Strymon acis leucosticha* H. K. Clench, n. subsp. 24-25. Holotype ♂, upper (24) and under (25) surfaces; TURKS AND CAICOS: Middle Caicos I.: Conch Bar, 9.ii.1978, H. and M. Clench sta. 491 (CMNH). 26-27. Paratype ♀, upper (26) and under (27) surfaces; same data as holotype ♂ (CMNH). Scale line = 10 mm.

*Strymon acis leucosticha* H. K. Clench, new subspecies  
(Fig. 24-27)

*Description*.—Sexes similar. Upper and under surfaces much grayer than any other subspecies of *acis*. Upper hindwing with a very prominent row of submarginal white spots (most evident in female) and a black submarginal spot in space  $Cu_1$ - $Cu_2$  between the tails that is always in female, occasionally in male, narrowly capped with reddish orange. Underforewing with bold white postmedian line, occasionally with a dark shade basad; underhindwing with typical white markings of *acis* and strong black shading basad, costal basal white spot well developed, one in cell only weakly indicated and wedge-shaped orange spot yellow orange and rather extensive.

[Length of forewing of holotype male 12.8 mm; male paratypes range from 12.1 to 14.2 mm, averaging 12.9 mm; female paratypes range from 11.8 to 14.0 mm, averaging 13.1 mm.]

Described from 55 specimens, 19 male and 36 female, from the Caicos Islands.

*Type material*.—Holotype male: MIDDLE CAICOS: Conch Bar, 9.ii Sta. 491; TURKS & CAICOS IDS., H & M Clench, 1978, C. M. Acc. 29717. Paratypes: same data as holotype, 8 males and 15 females; same data as holotype, except Sta. 489, 2 females; same data as holotype, except Sta. 490, 2 males and 6 females; same data as holotype, except Sta. 492, 4 males and 13 females; NORTH CAICOS:



Whitby, 3.ii Sta. 479; TURKS & CAICOS IDS., H. and M. Clench, 1978, C. M. Acc. 29717, 3 females; 11.ii.1978, Sta. 496, 1 female.

*Disposition of type series.*—Holotype male, 15 male and 33 female paratypes, CMNH; three male and three female paratypes, AME.

*Etymology.*—The name is from the Greek for “white lined,” referring to the extensive white on the upper hindwing.

*Discussion.*—Shortly after my wife and I arrived on North Caicos we found, after much searching, three females of *acis*, flying about and visiting the flowers of *Croton* sp. (*linearis*, or near it). Several days later we flew over to Middle Caicos for the day, and, as we walked westward from the airstrip at Conch Bar, we encountered several *Croton* plants, where we found and took a few more *acis*. We proceeded further, and both *Croton* and *acis* became more numerous. Soon we reached a side road that headed north toward the nearby coast, and we followed it. It quickly began to cross an area of rolling hills, in sight of the sea. This area was covered solidly with low, heath-like vegetation, rarely more than 0.4–0.6 m high, at least half of which was *Croton* (the remainder included *Coccothrinax* palms and *Cocoloba uvifera*, among other things). In this *Croton* heath *acis leucosticha* was extremely common, and hundreds could have been taken in a few hours. They were flying, perching on the *Croton* leaves and feeding at its flowers.

The origin of *acis* in the Bahamas is clearly duplex. Subspecies *leucosticha*, a member of the more easterly and southerly group B [grayer under surface ground color], was probably derived from Hispaniola. The many distinctive differences between *leucosticha* and Hispaniolan *petioni* suggest that the two subspecies separated relatively long ago, perhaps before the last (Wisconsin) glaciation, and that *leucosticha* therefore probably weathered that glacial period in situ. The subspecies *armouri* belongs to the more northern and western group A [browner under surface ground color], and from its range in the central Bahamas one would infer a Cuban origin for it, consistent with that membership. Curiously, however, *armouri* bears little resemblance to Cuban *casasi* and instead closely resembles the Jamaican subspecies *gossei*, a pattern strikingly similar to that found in *Electrostrymon angelia*.